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DESCRIPTIONS OF SOME GENERA OF FOSSIL ODONATA

By J. Cowley, M.A.

In his last work on fossil insects Handlirsch (1939) proposed a number of new genera of fossil Odonata; unfortunately two of the names proposed by him are already preoccupied in Odonata, and further a number of them are invalid, as Handlirsch has not complied with Article 25c of the International Code of Zoological Nomenclature.

These invalid generic names are accordingly again proposed in this paper, with descriptions and designations of the genotypes, and wherever Handlirsch had previously supplied a description or a genotype, the names have been credited to him as author; but in some cases Handlirsch gave neither a description nor a genotype, and these being absolute *nomina nuda* I have not given his name as the author in defining them here. In the great majority of cases figures of the species involved are available, and with their aid (with all due consideration, I hope, of the possible inaccuracies of some figures) I have largely recast, altered and added to Handlirsch's descriptions (when these were given), and at the same time have changed the nomenclature of the wing-veins to the more recent Tillyardian system, Handlirsch having used the Comstock–Needham system. In carrying through this redescription it became evident that some of the genera were still definitely heterogeneous, so that I have found it necessary to propose a number of new genera not considered by Handlirsch. In some cases also I do not entirely agree with Handlirsch's classification, and in these I have discussed the points of disagreement. One or two other points which have arisen in connection with these redescriptions are also dealt with here, though not directly referred to in Handlirsch's work.

It is necessary to point out that the names of all higher categories (families, subfamilies, tribes) based on generic names ending in *-themis* must be emended. Hitherto the stem to which the group-ending is added has been taken as them-; but the Greek word θέμις has no such stem. There is, however, rather a wide choice of stems (as determined by cutting off the termination of the genitive singular); it may be themist- (Epic, Homeric), themit- or themid- (Attic), or themi- (Ionic). Of these four stems I suggest the adoption of themist- as being the Homeric form and occurring in combination in the well-known name Themistocles.

Suborder Anisozygoptera.

Family Mesophlebiidae.

Mesophlebia antinodalis Tillyard, 1916.

Mesophlebia antinodalis Tillyard, 1916, *Qd geol. Surv. Publ.* **253** : 25, fig. 4, pl. 4 fig. 2.
Tillyard, 1922, *Proc. Linn. Soc. N.S.W.* **47** : 452, fig. 75, pl. LII fig. 30.
Handlirsch, 1939, *Ann. naturh. Mus. Wien* **49** : 2, 11.
Mesophlebia tillyardi Handlirsch, 1939, *Ann. naturh. Mus. Wien* **49** : 2, 11 (**syn. n.**).

Handlirsch (1939) considers that the two specimens described by Tillyard (1916, 1922) as *M. antinodalis* from the Trias of Australia belong to two species, and possibly to two genera, and has named the later specimen (of Tillyard, 1922) *M. tillyardi*. But it should be recollected that Tillyard (1922) suggested that the latter specimen might be a fore-wing, and the type-specimen of *M. antinodalis* a hind-wing, and further that as the type-specimen was not very well pre-

served in places, the differences between the specimens might not really be as great as they appear. Certainly if the apparent differences are real, Handlirsch's suggestion of a new genus and species would seem to be justified, but until some attempt has been made to substantiate this by a re-examination of the type it seems to me best to relegate *M. tillyardi* to synonymy.

Family Isophlebiidae.

Hemerobioides Westwood, 1845.

Hemerobioïdes Buckman, 1839, *Proc. geol. Soc. Lond.* **2** : 688 (*nom. nud.*).
Hemerobioides Westwood *in* Brodie, 1845, *Hist. Foss. Ins. Second. Rocks Engl.* : xiv, 45, 123, pl. 6 fig. 22.

Fore-wing : differs from *Isophlebia* Hagen, 1866 and *Anisophlebia* Handlirsch, 1906 in having 1*A* much longer, less strongly undulate, converging towards Cu_2, and at the point where the discoidal field is widest (Cu_2 being rather abruptly curved at this point as in *Isophlebia*) separated from Cu_2 by only a single row of cells, distal to this point Cu_2 and 1*A* diverging.

Genotype, and only species : *Hemerobioides giganteus* Westwood, 1845 (Jurassic, England).

It is unfortunate that the generic name of this fossil should recall so closely the Neuroptera Planipennia, to which Order it was originally thought to belong. Needham (1903, *Proc. U.S. nat. Mus.* **26** : 761) appears to have been the first author to indicate its true affinities with the Isophlebiid Odonata; Handlirsch (1906) came to the same conclusion and placed it in the genus *Isophlebia*, and if this were its correct position *Isophlebia* would have to fall as a synonym of *Hemerobioides*, and the name of the family correspondingly change. But the form of the anal part of the fore-wing differs so markedly from *Isophlebia* that I do not think it can be retained in this genus, and the generic name *Hemerobioides* must be revived for it, leaving *Isophlebia* as a valid genus and the family name unchanged.

The generic name *Hemerobioides*, and the specific name *giganteus*, have hitherto been credited to Buckman, 1839, but on referring to the supposed description one finds the following : " A notice, by Dr. Buckman, was afterwards read ' On the discovery of a fossil wing of a Neuropterous Insect in the Stonesfield slate ' . . . . Dr. Buckman believes that this is the first discovery of any remains of Neuroptera. . . . To the notice was appended a description of the wing by Mr. Westwood, from which the following is an extract :—' I have compared the fossil insect wing with the various genera of neuropterous insects, both indigenous and exotic, but it agrees with none of them. I apprehend there can be no doubt that it belonged to a tetrapterous insect, and to the order *Neuroptera*.' Dr. Buckman proposes to call the fossil insect *Hemerobioïdes giganteus*, from its being more nearly allied to the recent genus *Hemerobius* than to any other at present known." Here is no description, diagnosis, definition or indication, no figure, not even a reference as to the collection in which the fossil is to be found. It is true that one or more of these requirements may have been fulfilled by the complete text of Westwood's " description " which was appended to the notice, but this was not published, though presumably read at a meeting of the Society, and even if so read or presented it did not validate the name (International Code, Opinion 15 : Presentation of a paper before a scientific society does not constitute publication in the sense of the Code). The published extract from Westwood's " description," quoted above, which

merely states that the wing differs from the various genera of Neuroptera (*sens. lat.*), certainly cannot be held to describe the fossil in any way. The next mention of the generic and specific names are in Brodie, 1845, and there it is stated that the introductory matter (including p. xiv) and the descriptions of the plates (including p. 123) are by Westwood; here again there is no description, but the wing on which the names were based is figured, and this alone is sufficient to validate the names, which must therefore be credited to Westwood *in* Brodie, 1845.

Hemerobioides giganteus Westwood, 1845.

Hemerobioïdes giganteus Buckman, 1839, *Proc. geol. Soc. Lond.* **2** : 688 (*nom. nud.*).
Hemerobioides giganteus Westwood *in* Brodie, 1845, *Hist. Foss. Ins. Second. Rocks Engl.*: xiv, 45, 123, pl. 6 fig. 22.
Hemerobius giganteus Morris, 1854, *Cat. Brit. Foss., ed.* 2 : 117.
Hemerobius ? giganteus Hagen, 1866, *Stettin. ent. Ztg* **27** : 412.
Isophlebia gigantea Handlirsch, 1906, *Foss. Ins.* : 583.

Family Architemistidae (**nom. emend.**).

Diastatommidae Handlirsch, 1906, *Foss. Ins.* : 465.
Architheminae Tillyard, 1917, *Biol. Dragonflies* : 307.
Architemidae Handlirsch, 1920, *in* Schröder, *Handb. Ent.* **3** : 177.
Tillyard, 1925, *Brit. Mus. (nat. Hist.) foss. Ins.* **1** : 20.
Handlirsch, 1939, *Ann. naturh. Mus. Wien* **49** : 19.
Fraser, 1940, *Aust. Zool.* **9** : 363.

Discoidal cell of hind-wing a simple quadrilateral, undivided; subnodus placed beneath, not slightly distal to, the nodus; R_3 arising at or very close to subnodus; subquadrangle a closed cell not reaching anywhere near to posterior wing-margin; costal space crossed by a series of more than 4 [11 or more] unspecialised antenodals; IR_3 arises about half-way between arculus and nodus, R_{4+5} slightly or considerably proximal to IR_3; [IR_2 well developed, its straight part beginning only a few (about 4–7) cells distal to subnodus, proximal to the straight part only angulate for a few (about 2–6) cells; no marked oblique vein between R_3 and IR_3 distal to the nodus]; R_{4+5} and MA diverging strongly beyond the level of the nodus, with numerous (about 9–12) long and strongly oblique veins descending to the posterior wing-margin from the apical part of R_{4+5}; MA and Cu_2 slightly or markedly convergent, with few (about 3) marginal cells between their apices, no *oblique* veins running to the posterior wing-margin from the apical part of MA, but sectors *parallel* to MA and Cu_2 may be developed between the two veins; continuous rows of double cells between MA and Cu_2 not beginning till beyond the level of the nodus; $1A$ bending very abruptly towards the posterior wing-margin at about half-way between the base of the wing and the nodus; numerous (about 13–25) long strongly developed oblique veins descending to the posterior wing-margin from the apical part of Cu_2.

The characters placed within square brackets may eventually prove to be no more than of generic importance, as in the next family Selenothemistidae.

Tillyard (1917) changed the type-genus of the family from *Diastatomma* to *Archithemis*, on the grounds that *Diastatomma* Giebel is preoccupied by *Diastatomma* Brauer (actually, however, the author of the name *Diastatomma* is Burmeister, 1839); Handlirsch (1906) gives a genus "*Diastatomma* Giebel," but Giebel never proposed such a genus, merely having placed his species in the recent genus *Diastatomma* Burmeister, a member of the Gomphidae. Consequently *Archithemis* is the type-genus of the family, and not *Diastatommites* as one might suppose if from a hasty review of the literature *Diastatommites* were thought to be a *nomen novum* for "*Diastatomma* Giebel" *nec* Burmeister.

As restricted by Handlirsch (1939) the family contains only the two genera *Architemis* Handlirsch, 1906 (Upper Lias, Germany) and *Diastatommites* Tillyard, 1925 (Lower Lias, England), each with a single species; the remaining genera placed here by Tillyard (1925) have been removed by Handlirsch to the next family.

Family Selenothemistidae (nom. emend.).

Selenothemidae Handlirsch, 1939, *Ann. naturh. Mus. Wien* **49** : 20.

Discoidal cell of hind-wing a simple quadrilateral, undivided; subnodus placed beneath, not slightly distal to, the nodus; R_3 arising at or very close to the subnodus; subquadrangle a closed cell not reaching anywhere near to the posterior wing-margin; costal space crossed by a series of more than 4 unspecialised antenodals; IR_3 arises nearer the nodus than the arculus, R_{4+5} slightly or some distance proximal to IR_3; straight part of IR_2 beginning many cells distal to the subnodus, just proximal to the pterostigma or further distal, proximal to the straight part angulate for many cells; R_{4+5} and MA diverge gradually throughout their length (except in *Dialothemis*, in which they diverge more abruptly), with few (about 5–9) short weakly oblique veins descending to the posterior wing-margin from the apical part of R_{4+5}; MA and Cu_2 slightly divergent, with many (about 9–16) marginal cells between their apices, several weakly developed short oblique veins running from the apical part of MA to the posterior wing-margin, no marked sectors parallel to MA and Cu_2 between these two veins; continuous rows of double cells between MA and Cu_2 beginning proximal to the nodus; $1A$ regularly curved, or bending rather abruptly towards the posterior wing-margin more than half-way between the base of the wing and the nodus; few (about 8–10) short weakly oblique veins running to the posterior wing-margin from the apical part of Cu_2.

Possibly this group should be placed as a subfamily of Architemistidae, but I have here retained the family rank so recently assigned to it by Handlirsch. The only genus in which the basal part of the wing is known is *Selenothemis*; *Heterothemis*, *Liadothemis*, *Dialothemis* and *Oryctothemis* doubtfully belong here. The genera may be separated by the following key, which, owing to the fragmentary nature of many of the known fossils, is not arranged in any natural sequence.

Key to the genera of Selenothemistidae.

1(2). MA apically diverging rather abruptly from R_{4+5}; (straight part of IR_2 well defined, beginning proximal to the pterostigma (?), running much nearer to R_3 than to R_2, then arched costad to run close to R_2 to the wing-margin with only a single row of cells between it and R_2, and 3–4 cell-rows between it and R_3) . . . . . **Dialothemis** gen. n.

2(1). MA gradually diverging from R_{4+5}, not diverging abruptly apically (except to a very slight extent in *Selenothemis*, in which the form of IR_2 is very different from that in *Dialothemis*) . . . . . 3.

3(4). IR_3 arising close to the nodus, only 2 cells proximal to the subnodus, R_{4+5} arising 3 cells further proximal; (more than 7 antenodals; oblique vein distal to the nodus between R_3 and IR_3 weakly developed; two cell-rows between R_2 and R_3 beginning about 6 cells distal to the nodus; two cell-rows between R_{4+5} and MA beginning somewhat distal to the nodus; two cell-rows between MA and Cu_2 beginning proximal to the level of the origin of R_{4+5}; apex of Cu_2 not curved apicad; $1A$ strongly curved but not bent abruptly to the posterior wing-margin) . . . *Heterothemis* Handlirsch, 1906.

4(3). IR_3 not arising close to the nodus, more than 2 cells proximal to the subnodus, at about $\frac{2}{3}$–$\frac{1}{2}$ of the distance between the arculus and the nodus; R_{4+5} arising one cell proximal to IR_3 . . . . . 5.

5(6). About 16 or more antenodals; IR_3 arising at about $\frac{2}{3}$ of the distance between the arculus and the nodus; straight part of IR_2 well defined, beginning proximal to the pterostigma, nearer to R_3 than to R_2, directed obliquely costad and then beneath the pterostigma running close to R_2 to the wing-margin with only a single row of cells between it and R_2 and 4–5 cell-rows between it and R_3; apex of Cu_2 curved somewhat apicad; (oblique vein distal to the nodus between R_3 and IR_3 well developed; two cell-rows between R_2 and R_3 beginning at between 4 cells distal to the nodus and half-way between the nodus and the pterostigma; two cell-rows between R_{4+5} and MA beginning slightly distal to the nodus; two cell-rows between MA and Cu_2 beginning proximal to the level of the origin of R_{4+5}; 1A fairly strongly curved but not abruptly bent towards the posterior wing-margin) . . . . . *Liadothemis* Handlirsch, 1906.

6(5). Less than 16 antenodals; IR_3 arising about half-way between the arculus and the nodus; IR_2 ill defined, one of a series of about 4 sectors running more or less parallel to R_2 and R_3 between these two veins, the sectors angulate for most of their length; apex of Cu_2 not curved apicad . . . . . 7.

7(8). About 6 antenodals; 2 cell-rows between R_2 and R_3 beginning about 2 cells distal to the nodus; 2 cell-rows between R_{4+5} and MA beginning at about the level of the nodus; 2 cell-rows between MA and Cu_2 beginning at about the level of the origin of IR_3; (oblique vein distal to the nodus between R_3 and IR_3 well developed; 1A abruptly bent towards the posterior wing-margin at about the level of the nodus) . *Selenothemis* Handlirsch, 1920.

8(7). 8 or more antenodals; 2 cell-rows between R_2 and R_3 beginning a few cells proximal to the pterostigma; 2 cell-rows between R_{4+5} and MA beginning a considerable distance distal to the level of the nodus; 2 cell-rows between MA and Cu_2 beginning some distance proximal to the level of the origin of R_{4+5} . . . . . *Oryctothemis* Handlirsch, 1906.

? *Oryctothemis* Handlirsch, 1906.

Oryctothemis Handlirsch, 1906, *Foss. Ins.*: 469.

Species: *Oryctothemis hageni* Handlirsch, 1906 (Lower Lias, England).

Selenothemis Handlirsch, 1920.

Selenothemis Handlirsch, 1920, *in* Schröder, *Handb. Ent.* **3**: 178.

Species: *Selenothemis liadis* Handlirsch, 1920 (Upper Lias, Germany).

? *Heterothemis* Handlirsch, 1906.

Heterothemis Handlirsch, 1906, *Foss. Ins.*: 468.

Species: *Heterothemis germanica* Handlirsch, 1906 (Upper Lias, Germany).

? *Liadothemis* Handlirsch, 1906.

Liadothemis Handlirsch, 1906, *Foss. Ins.*: 469.

Species: *Liadothemis hydrodictyon* Handlirsch, 1906; *L. major* Handlirsch, 1939; *L. geinitzi* Handlirsch, 1939 (all Upper Lias, Germany).

? **Dialothemis** gen. n.

Characters and differences from other genera of the family as given in the key above; from the form of IR_2 probably closely allied to *Liadothemis*, from which it differs in the more abrupt apical divergence of R_{4+5} and MA and the marginal distance between their apices is greater than that between the apices of IR_3 and R_{4+5} (less than the latter distance in *Liadothemis*), so that the doubling of the cells between these two veins probably begins further distad than in *Liadothemis*. Only the apical part of the wing is known.

Genotype: *Liadothemis*? *dubia* Handlirsch, 1939 (*Ann. naturh. Mus. Wien* **49** : 22, pl. I fig. 6) (Upper Lias, Germany).

Derivation: an anagram of *Liadothemis*.

Family Heterophlebiidae.

Heterophlebiidae Handlirsch, 1906, *Foss. Ins.* : 466.
Tillyard, 1925, *Brit. Mus.* (*nat. Hist.*) *foss. Ins.* **1** : 25.

Key to the genera of Heterophlebiidae.

1(4). Fore-wings . . . . . 2.

2(3). MA ending at about the level of mid-pterostigma; MA and Cu_2 subparallel or diverging slightly; apex of Cu_2 straight, diverging from costa, ending proximal to the level of the pterostigma; marginal distance between the apices of Cu_2 and $1A$ subequal to, to $1\frac{1}{3}$ times, that between the apices of MA and Cu_2 . . *Heterophlebia* Brodie, 1849.

3(2). MA ending distal to the pterostigma; MA and Cu_2 converging slightly; apex of Cu_2 turned apicad, running more or less parallel to costa, ending at about the level of mid-pterostigma; marginal distance between the apices of Cu_2 and $1A$ about 3 times that between the apices of MA and Cu_2 . . . . . **Systellothemis** Handlirsch gen. n.

4(1). Hind-wings . . . . . 5.

5(6). Upperside of triangle ending at the distal angle of the hypertriangle. (Apex of MA curved posterad; MA and R_{4+5} diverging strongly, the marginal distance between their apices greater than that between the apices of IR_3 and R_{4+5} and about 3 times that between the apices of MA and Cu_2; MA and Cu_2 converging apically, the marginal distance between their apices about $\frac{1}{2}$ that between the apices of IR_3 and R_{4+5}) . . . . . **Clydonophlebia** gen. n.

6(5). Upperside of triangle ending well below the distal angle of the hypertriangle . . . . . 7.

7(10). IR_2 arising nearer the nodus than the pterostigma, or at least proximal to the pterostigma . . . . . 8.

8(9). IR_2 running approximately equidistantly from R_2 and R_3, beneath the pterostigma about 3–4 cells between R_2 and IR_2 and between IR_2 and R_3, no other distinct longitudinal sector between R_2 and R_3. (Apex of MA running straight to wing-margin, not curved posterad; MA and R_{4+5} subparallel, diverging slightly, the marginal distance between their apices about $\frac{1}{2}$ the distance between the apices of IR_3 and R_{4+5} and of MA and Cu_2; MA and Cu_2 diverging slightly apically, the marginal distance between their apices about equal to that between the apices of IR_3 and R_{4+5}.) . . . . . *Heterophlebia* Brodie, 1849.

9(8).[1] IR_2 running nearer R_3 than R_2 beneath the pterostigma, at this level about 7–8 cells between R_2 and IR_2 and about 5–6 cells between IR_2 and R_3, and with a further short apical sector between R_2 and IR_2 2 cell-rows below R_2 . . . . . **Acrophlebia** gen. n.

10(7).[1] IR_2 short, its straight part beginning distal to the proximal end of the pterostigma. (IR_2 subparallel to R_2, only 2 cell-rows between them, decreasing to one cell-row further distad, about 5–6 cells between IR_2 and R_3 beneath the pterostigma) . . . . . **Acrophlebia** gen. n.

Heterophlebia Brodie, 1849.

Fore-wing: MA ending at about the level of the middle of the pterostigma; MA and Cu_2 subparallel, sometimes slightly diverging apically; apex of Cu_2 straight, diverging from costa, ending proximal to the level of the pterostigma; marginal distance between the apices of Cu_2 and $1A$ subequal to, to $1\frac{1}{3}$ times, the marginal distance between the apices of MA and Cu_2. Hind-wing: upperside of triangle ending well below the distal angle of the hypertriangle; IR_2 arising nearer the nodus than the pterostigma, running approximately equidistantly from R_2 and R_3, beneath the pterostigma about 3–4 cells between R_2 and IR_2 and between IR_2 and R_3, no other distinct longitudinal sectors between R_2 and R_3; R_3 already diverging from IR_3 at the level at which double cells between IR_3 and R_{4+5} begin, R_3 and IR_3 subparallel for the greater part of their length as far as the posterior wing-margin; IR_3 only gently curved; double cells between IR_3 and R_{4+5} beginning slightly proximal to the origin of IR_2; R_{4+5} with only a slight undulation; MA subparallel to R_{4+5}, diverging slightly, its apex running straight to the posterior wing-margin; the marginal distance between the apices of MA and R_{4+5} about half the marginal distances between the apices of IR_3 and R_{4+5} and of MA and Cu_2; MA and Cu_2 diverging slightly apically, the marginal distance between their apices about equal to that between the apices of IR_3 and R_{4+5}.

Handlirsch (1939 : 24) separated *H. dislocata* (Brodie, 1849) from *H. buckmani* (Brodie, 1845), and erected a new species, *H. tillyardi* Handlirsch, 1939, all these three forms having been included in *buckmani* by Tillyard (1925). Handlirsch's reasons for distinguishing three species seem, however, to be somewhat vague, and *dislocata* and *tillyardi* are perhaps best considered as possible synonyms of *buckmani* until the specimens can be re-examined. There are then two species of the genus from the Upper Lias of England, *buckmani* and *angulata* Tillyard, 1925, and seven from the Upper Lias of Germany, *proxima* Bode, 1907, *geinitziella* Handlirsch, 1939, *dobbertinensis* Handlirsch, 1939, *germana* Handlirsch, 1939, *gracilis* Handlirsch, 1939, *similis* Handlirsch, 1939 and *debilis* Handlirsch, 1939; *megapolitana* Handlirsch, 1939 and *geinitzi* Handlirsch, 1906, also from the Upper Lias of Germany, are here referred to two new genera. Tillyard (1925) included three specimens from the *Lower* Lias of England under *H. buckmani*; these specimens are considered by Handlirsch (1939) as three doubtful, unnamed, species of *Heterophlebia*, which course is perhaps the best to follow at present.

Systellothemis Handlirsch gen. n.

Systellothemis Handlirsch, 1939, *Ann. naturh. Mus. Wien* **49** : 27 (*nomen nudum*).
Fraser, 1940, *Aust. Zool.* **9** : 363 (*nomen nudum*).

Fore-wing: similar to *Heterophlebia*, but differs as follows: MA ending distal to the level of the distal end of the pterostigma; MA and Cu_2 subparallel, slightly converging

[1] *Acrophlebia* cannot agree with both these antitheses, but only with one; both have been included on account of some uncertainty in the identification of the veins involved, so that whichever interpretation is adopted *Acrophlebia* can be found in the key.

apically; apex of Cu_2 turned apicad, running more or less parallel to the costa, ending at about the level of the middle of the pterostigma; marginal distance between the apices of Cu_2 and $1A$ greater, about $3\frac{1}{2}$ times the marginal distance between the apices of MA and Cu_2.

Genotype: *Systellothemis reticulata* Handlirsch, 1939 (*Ann. naturh. Mus. Wien* **49**: 27, pl. II fig. 15) (Upper Lias, Germany).

Derivation: συστέλλω, to draw in, contract (with reference to the area between MA and Cu_2?) or to wrap up, veil (as a fossil?); θέμις, law, order, justice.

The generic name as proposed by Handlirsch (1939) is nomenclaturally invalid as from the date 1939, and a *nomen nudum*; he gave a diagnosis (of one character only) but designated no type-species; it therefore fulfils the conditions of the International Code, Art. 25c 1, 2, but is invalid under 25c 3.

Handlirsch placed the genus among the Anisozygoptera incertae sedis, and suggested that it is related to *Liadothemis* or *Heterophlebia*. The important basal part of the wing is missing, but all the rest is closely similar to *Heterophlebia* (the form of IR_2, for example, is very different to that in *Liadothemis* but agrees with *Heterophlebia*), except for the characters noted above, so that I place it with little hesitation in the family Heterophlebiidae. Differences from other genera of the family are given in the key above.

Clydonophlebia gen. n.

Hind-wing: upperside of triangle ending at the distal angle of the hypertriangle; basal space possibly with a cross-vein proximal to the arculus; IR_2 arising nearer the nodus than the pterostigma, probably running about equidistantly from R_2 and R_3; R_3 remains parallel to IR_3 to the level at which 3 cell-rows begin between IR_3 and R_{4+5}, distal to this level gradually diverging from IR_3; IR_3 markedly curved medially; double cells between IR_3 and R_{4+5} beginning distal to the level of the origin of IR_2; R_{4+5} moderately undulated; MA subparallel to R_{4+5} to somewhat distal to the nodus, then diverging strongly, its apex curved posterad to the wing-margin; the marginal distance between the apices of MA and R_{4+5} greater than that between the apices of IR_3 and R_{4+5} and about 3 times that between the apices of MA and Cu_2; MA and Cu_2 converging apically, the marginal distance between their apices about $\frac{1}{2}$ that between the apices of IR_3 and R_{4+5}.

Genotype: *Heterophlebia megapolitana* Handlirsch, 1939 (*Ann. naturh. Mus. Wien* **49**: 26, pl. I fig. 11) (Upper Lias, Germany).

Derivation: κλύδων, κλύδωνος, a wave (with reference to IR_3, R_{4+5} and MA); φλέψ, φλεβός, vein.

Differences from other genera of the family are given in the key above.

Handlirsch (1939) suggested that the specimen on which *C. megapolitana* is based may have been deformed during fossilisation; however, he does not definitely state that it is deformed or distorted, which condition might account for the characteristic curvature and position of R_{4+5} and MA. But even if this supposition of distortion could be proved, the form of the discoidal cell remains to separate the genus from *Heterophlebia*. Handlirsch's figure shows a broken cross-vein in the basal space just proximal to the arculus; if indeed a cross-vein in this position does occur, and is not an individual aberration or accident of fossilisation, then possibly *Heterophlebia*? *gracilis* (which also has a cross-vein in the basal space) might be a fore-wing of this genus.

Acrophlebia gen. n.

Hind-wing: upperside of triangle ending well below the distal angle of the hypertriangle; disposition of IR_2 and R_3 either (1) IR_2 short, its straight part beginning distal to the proximal end of the pterostigma, subparallel and very close to R_2, only 2 cell-rows between them, decreasing to 1 cell-row further distad, about 5–6 cells between IR_2 and R_3 beneath the pterostigma; or (2) IR_2 long, arising before the level of the pterostigma, running nearer R_3 than R_2 beneath the pterostigma, at this level about 7–8 cells between R_2 and IR_2 and about 5–6 cells between IR_2 and R_3, and with a further short apical sector between R_2 and IR_2 2 cell-rows below R_2.

Genotype: *Heterophlebia geinitzi* Handlirsch, 1906 (*Foss. Ins.*: 467, pl. XLII figs. 4, 5) (Upper Lias, Germany).

Derivation: ἄκρος, outermost (with reference to the distinct venation of the apex of the wing); φλέψ, φλεβός, vein.

Differences from other genera of the family are given in the key above.

The veins in the costo-apical fragment of the wing, in default of a new examination of the type, could be interpreted in one of two ways, as noticed in the description above. C, R_1 and R_2 can be certainly identified; the remaining three distinct longitudinal veins preserved posterior to the level of the pterostigma may be either (1) IR_2, R_3 and IR_3, or (2) a supplementary sector, IR_2 and R_3; in either case the arrangement of the longitudinal veins in this part of the wing differs from the arrangement, where known, in the other genera of the family, and where this part of the wing is not known in the other genera, then the form of the discoidal cell distinguishes them from *Acrophlebia*.

Anisozygoptera incertae sedis.

Rhabdothemis gen. n.

Rhabdothemis Handlirsch, 1939, *Ann. naturh. Mus. Wien* **49**: 28 (*nomen nudum*).
Fraser, 1940, *Aust. Zool.* **9**: 363 (*nomen nudum*).

Agrees with *Temnostigma* in the following characters: pterostigma robust, rather short and broad, R_1 more or less concave below it, close to apex, the distance from apex of pterostigma to apex of R_1 slightly shorter than the pterostigma itself; two long sectors between R_2 and IR_2 arising at about the levels of proximal end of to middle of pterostigma; IR_2 arising well proximal to pterostigma; two long sectors between IR_2 and R_3 arising proximal to pterostigma; about 5–6 marginal cells between the apices of IR_2 and R_3; only one row of cells between R_3 and IR_3 to beyond middle of pterostigma, no long sectors between them, about 5–6 marginal cells between their apices; two long sectors between IR_3 and R_{4+5}, the longer arising proximal to pterostigma; about 6 marginal cells between the apices of IR_3 and R_{4+5}; one long sector between R_{4+5} and MA, arising at the level of the fourth postnodal proximal to pterostigma, or further proximal; about 5–6 marginal cells between the apices of R_{4+5} and MA; MA ending at about the level of middle of pterostigma. Differs from *Temnostigma* as follows: about 3 marginal cells between the apices of R_2 and IR_2; longest sector between IR_2 and R_3 arising proximal to the level of the sixth postnodal proximal to the pterostigma; longest sector between IR_3 and R_{4+5} arising proximal to the level of the fifth postnodal proximal to pterostigma; pterostigma relatively shorter and width of wing below pterostigma relatively greater, this width greater than the distance from proximal end of pterostigma to apex of R_1; R_1 only slightly concave below pterostigma and not approaching R_2 closely; wing shorter, estimated as about 30 mm. long.

Genotype: *Rhabdothemis strigivena* Handlirsch, 1939 (*Ann. naturh. Mus. Wien* **49**: 28, pl. I fig. 2) (Upper Lias, Germany).

Derivation : ῥάβδος, a rod, stick; θέμις, law, order, justice.

This genus and *Temnostigma* are known only from the apices of wings, so that their exact systematic position cannot be determined; but this apical part differs from all other Liassic Anisozygoptera, with the exception of *Parelthothemis* Handlirsch, 1906 (also only known from the apex of a wing) which somewhat resembles them, but in which there are three long sectors between R_2 and IR_2, and possibly a greater distance between the apices of R_2 and R_3 and a long sector between R_3 and IR_3 (without access to the type-specimens on which these genera are based, I have accepted the identification of the main veins as given by Handlirsch). No doubt some of the characters given above are subject to some variation within a species, but I think that until intermediates may be discovered, *Parelthothemis*, *Rhabdothemis* and *Temnostigma* are worthy of generic distinction.

As in proposing the genus Handlirsch gave no diagnosis, reference to such a diagnosis, nor genotype, therefore not complying with the International Code, Art. 25c 1–3, his name is invalid and a *nomen nudum*.

Temnostigma gen. n.

Temnostigma Handlirsch, 1939, *Ann. naturh. Mus. Wien* **49** : 28 (*nomen nudum*).
Temnothemis Fraser, 1940, *Aust. Zool.* **9** : 363 (*nomen nudum*).

Agrees with *Rhabdothemis* in the characters given above under that genus, and differs as follows : about seven marginal cells between the apices of R_2 and IR_2; longest sector between IR_2 and R_3 arising at about the level of the sixth postnodal proximal to pterostigma; longest sector between IR_3 and R_{4+5} arising at about the level of the second postnodal proximal to pterostigma; pterostigma relatively longer and width of wing below pterostigma relatively less, this width less than the distance from proximal end of pterostigma to apex of R_1; R_1 markedly concave below pterostigma and approaching R_2 closely; wing about $1\frac{1}{3}$ times as long as in *Rhabdothemis*, estimated as about 40 mm. long.

Genotype : *Temnostigma singulare* Handlirsch, 1939 (*Ann. naturh. Mus. Wien* **49** : 28, pl. II fig. 17) (Upper Lias, Germany).

Derivation : τέμνω, to cut off, cut short; (ptero-) stigma.

As proposed by Handlirsch, the generic name *Temnostigma* is invalid for the same reasons as those given above under *Rhabdothemis*, not complying with the International Code, Art. 25c 1–3; *Temnothemis* Fraser, 1940, a *nomen nudum* in a list of genera only, is evidently an error for *Temnostigma*.

Pycnothemis gen. n.

Pycnothemis Handlirsch, 1939, *Ann. naturh. Mus. Wien* **49** : 28 (*nomen nudum*).

Distinguished as follows: pterostigma robust, moderately long, followed by two rows of cells between C and R_1 nearly to the apex of R_1; two rows of cells between R_1 and R_2 from beyond the apex of pterostigma nearly to apex of R_2; IR_2 not to be distinguished in the network of cells between R_2 and R_3; 5–9 cells between R_2 and R_3, these two veins diverging to below the pterostigma, then converging to the wing-margin; R_3 and IR_3 subparallel, no sector between them but two rows of cells beginning just proximal to pterostigma; IR_3 and R_{4+5} subparallel, no distinct long sectors between them but three rows of cells beginning at least proximal to pterostigma and continuing for several cells; R_{4+5} and MA subparallel, slightly diverging apically, no distinct longitudinal sectors between them but two or more rows of cells beginning at about the level of the apex of Cu_2; MA and Cu_2 close together subapically but diverging rapidly by the abrupt curvature of Cu_2

posterad, the apices of the two veins widely distant, one long sector between them extending back to the region where they are subparallel and close together.

Genotype : *Pycnothemis densa* Handlirsch, 1939 (*Ann. naturh. Mus. Wien* **49** : 28, pl. II fig. 18) (Upper Lias, Germany).

Derivation : πυκνός, compact, dense (with reference to the venation); θέμις, law, order, justice.

Known only from the apex of the wing; the marked apical curvature of Cu_2 (if this vein be correctly identified) is a distinctive feature.

As proposed by Handlirsch, the generic name *Pycnothemis* is invalid for the same reasons as those given above under *Rhabdothemis*, not complying with the International Code, Art. 25c 1–3.

Suborder Anisoptera.

Family Liassogomphidae.

Gomphitidae Tillyard, 1925, *Brit. Mus.* (*nat. Hist.*) *Foss. Ins.* **1** : 33.
Liassogomphidae Tillyard, 1935, *Proc. Linn. Soc. N.S.W.* **60** : 381.
Fraser, 1940, *Aust. Zool.* **9** : 363.

Tillyard (1925) placed the Liassic genus *Gomphites* Tillyard, 1925 (preoccupied, = *Liassogomphus* Cowley, 1934), known from the hind-wing alone, in a separate family Gomphitidae of the Anisozygoptera. But with the discovery of an Anisopterous fore-wing, with the discoidal cell divided into triangle and hypertriangle, in the Lias (*Palaeogomphus propinquus* (Bode, 1907)), which resembles (subject to the usual differences between fore- and hind-wings) the hind-wing of *Liassogomphus* and other genera, the placing of *Liassogomphus* in the Anisozygoptera is open to serious doubt. Further, Handlirsch's drawing [2] of the venation of *Liassogomphus brodiei* (Buckman, 1843) (1939, *Ann. naturh. Mus. Wien* **49** : pl. II fig. 19) differs in certain particulars from that given by Tillyard (1925, *Brit. Mus.* (*nat. Hist.*) *Foss. Ins.* **1** : fig. 13), which further weaken Tillyard's contention that *Liassogomphus* is an Anisozygopteron. To take Tillyard's arguments in turn : the hind-wing of *Liassogomphus* only being known, and not being typically Gomphine, there is no proof that the fore-wing even possessed a triangle ; *i.e.* there is no proof that the insect was Anisopterous. (But the fore-wing of a related Liassic genus is now known, and in this a triangle is present.) No other Liassic Anisoptera was known to Tillyard (but the fore-wing of *Palaeogomphus* is Anisopterous). The triangle and subtriangle of the hind-wing are not of Gomphine type, the upperside of the triangle ending well below the distal angle of the hypertriangle (but this occurs to a slight extent in some Gomphines, *e.g. Davidius, Merogomphus* ; in the hind-wing of the related Liassic *Necygomphus brunswigiae* (Handlirsch, 1939) the upperside of the triangle appears to end at the distal angle of the hypertriangle). There is no true subtriangle formed, as in true Anisoptera, but only the more primitive subquadrangular cell, which extends from below the arculus right round to the basal stalk of $1A$, whereas a true subtriangle should only abut upon the basal side of the triangle itself (Handlirsch's drawing of the subtriangle differs somewhat from Tillyard's, and might be interpreted as having the costal side of the subtriangle running almost horizontally to end almost at the middle of the basal

[2] Although he does not definitely say so, it would seem that Handlirsch's figure was made from the type-specimen, since he stated concerning the subtriangle that his figure differs from Tillyard's, while in the photograph of the type (from which Tillyard's figure was drawn) it is indistinct.

side of the triangle, with a cross-vein running from it to the arculus (cubito-anal cross-vein?); further, in the hind-wings of some recent genera, *e.g. Davidius*, *Merogomphus*, the costal (basal) side of the subtriangle may end between the arculus and the basal angle of the triangle, while in the hind-wings of the Liassic *Proinogomphus bodei* Handlirsch, 1939 and *Phthitogomphus angulatus* (Handlirsch, 1939) the subtriangles again differ somewhat, suggesting the earlier variable stages in the formation of a stable subtriangle). The condition of the so-called basal stem of 1*A* is very primitive, which is simply a cross-vein continuing the line of the distal side of the triangle, at right angles to the rest of the vein called 1*A* in recent Odonata, this condition differing very greatly from that found in the Gomphidae, where the basal stem of 1*A* is in line, not with the distal, but with the *basal* side of the triangle, and is continuous with the rest of the vein 1*A* along a gentle curve (but this may merely be caused by the separation of the anal angle of the triangle from the smoothly-curved part of 1*A*, such as occurs in some Chlorogomphidae and Petaluridae). The area behind 1*A* in recent Gomphidae is never so extensive, nor does it reach as far as the level of the nodus (but *Liassogomphus* has a broad wing, and in some Gomphidae, *e.g. Ictinogomphus*, the apex of 1*A* may approach very nearly the level of the nodus). In Gomphidae the pterostigma is always more or less swollen so as to be definitely wider in the middle than at its ends, whereas that of *Liassogomphus* is of the more primitive elongated type without any definite median thickening (but Handlirsch's figure of *Liassogomphus* shows a broader pterostigma with a definite median thickening; also the pterostigma of the recent *Ictinogomphus* is more like that in Tillyard's figure of *Liassogomphus* than it is in Handlirsch's).

There are certainly many resemblances between the hind-wings of *Heterophlebia* and *Liassogomphus*, but in view of the discovery of the Anisopterous forewing of *Palaeogomphus propinquus*, I cannot see that this indicates more than that *Liassogomphus* (and related genera) are primitive Anisoptera perhaps annectent between the Anisozygopterous Heterophlebiidae and the recent Gomphid groups. (Tillyard later (1935, *Proc. Linn. Soc. N.S.W.* **60** : 381) suggested that the Liassogomphidae were connected with the Anisoptera via the recent Tachopteryginae.) I have therefore followed Handlirsch (1939) in assigning the family Liassogomphidae (Gomphitidae) to the Anisoptera, but have not followed him in merging the family in the Gomphidae, preferring to retain it for these Liassic forms, pending a more detailed examination of these and other genera (such as the Cymatophlebiinae and Protolindeniinae of Handlirsch, which should be studied afresh from the type-specimens before these genera can be placed more definitely).

Key to the genera of Liassogomphidae discussed here.

1(2). (Hind-wing). IR_2 long, arising about half-way between nodus and pterostigma, beneath pterostigma separated from R_2 by three cell-rows; upperside of triangle ending at distal angle of hypertriangle; triangle and subtriangle free . . . . . **Necygomphus** gen. n.

2(1). IR_2 short, arising at the level of the middle or distal end of pterostigma, separated from R_2 by 1–2 cell-rows; upperside of triangle ending below the distal angle of hypertriangle; triangle and subtriangle crossed 3.

3(4). (Hind-wing). Between MA and Cu_2 two cell-rows from triangle to about 8 cells distal to it, then increasing to 3 or more rows **Proinogomphus** gen. n.

4(3). Between MA and Cu_2 either 2 cell-rows to well distal to the level of nodus, or more than 2 rows at triangle . . . . . 5.

5(6). (Fore-wing). Basal space crossed; MA and Cu_2 subparallel, distally markedly narrowed subapically by the concavity of MA **Palaeogomphus** gen. n.

6(5). (Hind-wing). Basal space free; MA and Cu_2 subparallel, diverging slightly apically, MA not markedly concave so as to cause a distinct narrowing of the field between it and Cu_2 . . . . . 7.

7(8). Two cell-rows between R_3 and IR_3 beginning about half-way between nodus and pterostigma; between MA and Cu_2 three cell-rows to the level of the origin of R_{4+5} . . . . . *Liassogomphus* Cowley, 1934.

8(7). Two cell-rows between R_3 and IR_3 beginning just proximal to pterostigma; between MA and Cu_2 four cell-rows to about the level of nodus . . . . . **Phthitogomphus** gen. n.

Liassogomphus Cowley, 1934.

Entomologist **67** : 275.

Gomphites Handlirsch, 1920, *in* Schröder, *Handb. Ent.* **3** : 183 (*nomen nudum*).
Tillyard, 1925, *Brit. Mus.* (*nat. Hist.*) *Foss. Ins.* **1** : 35 (preoccupied by *Gomphites* Carter, 1871, in Spongida).

Hind-wing: basal space free; upperside of triangle ending below distal angle of hypertriangle; triangle and subtriangle crossed; R_{4+5} and MA somewhat undulate subapically, the latter not sufficiently so as to narrow markedly the discoidal field (between MA and Cu_2); between R_2 and R_3 two cell-rows beginning close to nodus; IR_2 arising at the level of middle of pterostigma, separated from R_2 by one row of cells (according to Tillyard's figure; two cell-rows according to Handlirsch's figure); two cell-rows between R_3 and IR_3 beginning about half-way between nodus and pterostigma; two cell-rows between IR_3 and R_{4+5} beginning at the level of nodus; R_{4+5} and MA subparallel, two cell-rows between them beginning about one-third of the distance between nodus and pterostigma; MA and Cu_2 diverging slightly, three cell-rows between them from the triangle to level of origin of R_{4+5}, then cell-rows increasing to wing-margin; marginal distances between apices of IR_3 and R_{4+5}, R_{4-5} and MA, MA and Cu_2, Cu_2 and $1A$ about 3, 1, $2\frac{1}{4}$, $1\frac{1}{2}$ times respectively that between the apices of R_2 and R_3.

The only species is *L. brodiei* (Buckman, 1843) of the Upper Lias of England, and has been figured by Tillyard (1925 : fig. 13, pl. IV fig. 12) and Handlirsch (1939 : pl. II fig. 19).

Necygomphus gen. n.

Necrogomphus Handlirsch, 1939, *Ann. naturh. Mus. Wien* **49** : 31 (*nomen nudum*; preoccupied by *Necrogomphus* Campion, 1923, in Odonata).

Hind-wing: basal space possibly crossed; upperside of triangle ending at distal angle of hypertriangle; triangle and subtriangle free; R_{4+5} and MA not undulate, running in regular curves to the posterior wing-margin; between R_2 and R_3 two cell-rows beginning about half-way between nodus and pterostigma; IR_2 arising about half-way between nodus and pterostigma, below pterostigma separated from R_2 by three cell-rows; two cell-rows between R_3 and IR_3 beginning beneath pterostigma; two cell-rows between IR_3 and R_{4+5} beginning about one-third of the distance between nodus and pterostigma; R_{4+5} and MA subparallel, one cell-row between them from triangle for three cells, then two cell-rows to well beyond the level of nodus; marginal distances between the apices of IR_3 and R_{4+5}, R_{4+5} and MA, MA and Cu_2, Cu_2 and $1A$ about 2, 1, $1\frac{1}{2}$, 3 times respectively that between the apices of R_2 and R_3.

Genotype : *Necrogomphus brunswigiae* Handlirsch, 1939 (*Aeschna* (*Gomphus*) cf. *brodiei* Bode, 1907, *Jb. preuss. geol. Landesanst.* **25** : 238, pl. 7 fig. 12) (Upper Lias, Germany).

Derivation : νέκυς, dead; *Gomphus*.

Differences from the other genera of the family are given in the key above.

Palaeogomphus gen. n.

Palaeogomphus Handlirsch, 1939, *Ann. naturh. Mus. Wien* **49** : 31 (*nomen nudum*).

Fore-wing : basal space crossed; upperside of triangle ending below distal angle of hypertriangle; triangle and subtriangle crossed; R_{4+5} and MA distinctly undulate subapically and the concavity of MA markedly narrowing the discoidal field; between R_2 and R_3 two cell-rows beginning about one-third of the distance between nodus and pterostigma; IR_2 arising at about the level of distal end of pterostigma, separated from R_2 by one cell-row; two cell-rows between R_3 and IR_3 beginning just proximal to pterostigma; two cell-rows between IR_3 and R_{4+5} beginning just distal to level of nodus; R_{4+5} and MA diverging slightly, two cell-rows between them beginning at the level of the nodus; MA and Cu_2 subparallel, discoidal field distinctly narrowed subapically, then again expanding to about its former width, between the two veins three cell-rows from triangle to about the level of origin of R_{4+5}; marginal distances between the apices of IR_3 and R_{4+5}, R_{4+5} and MA, MA and Cu_2, Cu_2 and $1A$ about $2\frac{1}{2}$, $\frac{1}{2}$, $1\frac{3}{4}$, $1\frac{1}{2}$ times respectively that between the apices of R_2 and R_3.

Genotype : *Heterophlebia propinqua* Bode, 1907 (*Jb. preuss. geol. Landesanst.* **25** : 233, pl. 7 fig. 10) (Upper Lias, Germany).

Derivation : παλαιός, ancient; *Gomphus*.

Differences from the other genera of the family are given in the key above.

Palaeogomphus Handlirsch, 1939, is a *nomen nudum*, as Handlirsch has not complied with Art. 25c 1–3 of the International Code.

Proinogomphus gen. n.

Proinogomphus Handlirsch, 1939, *Ann. naturh. Mus. Wien* **49** : 31 (*nomen nudum*).

Hind-wing : upperside of triangle ending below distal angle of hypertriangle; triangle and subtriangle crossed; between MA and Cu_2 two cell-rows from triangle for about eight cells, then increasing.

Genotype : *Proinogomphus bodei* Handlirsch, 1939 (*Aeschna* (*Gomphus*) cf. *brodiei* Bode, 1907, *Jb. preuss. geol. Landesanst.* **25** : 237, pl. 7 fig. 11) (Upper Lias, Germany).

Derivation : πρωινός, early; *Gomphus*.

Differences from the other genera of the family are given in the key above. Handlirsch (1939) suggests that *Proinogomphus* is the hind-wing of *Palaeogomphus*, but against this suggestion it should be noted that in most, if not all, Gomphid genera the discoidal field of the hind-wing is broader than that of the fore-wing, the cell-rows beginning to increase more proximally in the hind-wing than in the fore-wing, whereas in the hind-wing of *Proinogomphus* there are two cell-rows for eight cells before they increase, and in the fore-wing of *Palaeogomphus* there are *three* cell-rows for quite this distance. Although only the basal portion of the wing of *Proinogomphus* is preserved, with the costal part also missing, yet I think this marked difference in the discoidal fields effectively prevents the hind-wing of *Proinogomphus* being assigned to *Palaeogomphus*.

Proinogomphus Handlirsch, 1939, is a *nomen nudum*, as Handlirsch has not complied with Art. 25c 1–3 of the International Code.

Phthitogomphus gen. n.

Paragomphus Handlirsch, 1939, *Ann. naturh. Mus. Wien* **49** : 31 (*nomen nudum*; preoccupied by *Paragomphus* Cowley, 1934, in Odonata).

Hind-wing: basal space free; upperside of triangle ending below distal angle of hypertriangle; triangle and subtriangle crossed; R_{4+5} and *MA* somewhat undulate subapically, the latter not sufficiently so as to narrow markedly the discoidal field; between R_2 and R_3 two cell-rows beginning close to nodus; IR_2 arising at about the level of distal end of pterostigma, separated from R_2 by one cell-row; two cell-rows between R_3 and IR_3 beginning just proximal to pterostigma; two cell-rows between IR_3 and R_{4+5} beginning just distal to level of nodus; R_{4+5} and *MA* subparallel, two cell-rows between them beginning at the level of nodus; *MA* and Cu_2 subparallel, diverging slightly apically, between them four cell-rows from triangle to about level of nodus; marginal distances between apices of IR_3 and R_{4+5}, R_{4+5} and *MA*, *MA* and Cu_2, Cu_2 and 1*A* about $5\frac{1}{2}$, 1, 3, 3 times respectively that between the apices of R_2 and R_3.

Genotype: *Paragomphus angulatus* Handlirsch, 1939 (*Aeschna* (*Gomphus*) cf. *brodiei* Bode, 1907, *Jb. preuss. geol. Landesanst.* **25** : 240, pl. 7 fig. 13) (Upper Lias, Germany).

Derivation: *φθιτός*, dead; *Gomphus*.

Differences from the other genera of the family are given in the key above.

Family Gomphidae.

? Subfamily Protolindeniinae.

As I have remarked above, the status and position of this subfamily and of the Cymatophlebiinae require more exact studies of the known specimens; for the present I follow Handlirsch in placing them in the Gomphidae.

Aeschnopsis Handlirsch gen. n.

Aeschnopsis Handlirsch, 1939, *Ann. naturh. Mus. Wien* **49** : 153 (*nomen nudum*).

Hind-wing: triangle markedly extended longitudinally, differing from *Mesuropetala* Handlirsch, 1906, in having a cross-vein; 1*A* long with many descending branches; differs (according to the figure in Brodie, 1845) from *Mesuropetala*, *Protolindenia* Deichmüller, 1886 and *Aeschnogomphus* Handlirsch, 1906, in having the fork of *Rs* markedly asymmetrical costad, R_{4+5} continuing the direction of *Rs* in a regular curve while R_{2+3} is arched forwards; also Cu_2 and 1*A* appear to converge strongly apically, though this last character may be due to imperfections of the fossil or of the figure.

Genotype: *Aeshna perampla* Brodie, 1845 (Jurassic, England).

Derivation: *Aeschna*; *ὄψις*, outward appearance.

Aeschnopsis Handlirsch, 1939, is a *nomen nudum*, as even if he can be considered to have given a generic description, he designated no genotype (International Code, Art. 25c 3).

Aeschnopsis perampla (Brodie, 1845).

Aeshna perampla Brodie, 1845, *Hist. foss. Ins. second. Rocks Engl.* : 33, 119, pl. 5 fig. 7.
Hagen, 1850, *Mém. Soc. Sci. Liége* **6** : 362.
Giebel, 1856, *Fauna Vorwelt* **2** : 281.
Kirby, 1890, *Syn. Cat. Neuropt. Odon.* : 173.
(Gomphidae ?) *perampla* Handlirsch, 1906, *Foss. Ins.* : 593.
Aeschnopsis perampla Handlirsch, 1939, *Ann. naturh. Mus. Wien* **49** : 153.

The type is in the British Museum; the locality is Teffont, Wiltshire, not Jeffont as given by Handlirsch (1939).

? Subfamily Cymatophlebiinae.

Cymatophlebiopsis Handlirsch gen. n.

Cymatophlebiopsis Handlirsch, 1939, *Ann. naturh. Mus. Wien* **49** : 153 (*nomen nudum*).

Hind-wing: differs from *Cymatophlebia* Deichmüller, 1886, and Protolindeniinae in having the triangle strongly extended longitudinally, divided by an oblique cross-vein and proximal thereto two larger cells; 1*A* with about six descending branches, separated from Cu_2 by only a few rows of cells.

Genotype: *Cymatophlebiopsis pseudobubas* Handlirsch, 1939 (Jurassic, England; type in British Museum).

Derivation: *Cymatophlebia*; ὄψις, outward appearance.

Cymatophlebiopsis Handlirsch, 1939, is a *nomen nudum*, as even if he can be considered to have given a generic description, he designated no genotype (International Code, Art. 25c 3). It is to be regretted that although Handlirsch had evidently seen the types of this species and of *Aeschnopsis perampla*, he did not figure them.

References.

Bode, A., 1907, Orthoptera und Neuroptera aus dem Oberen Lias von Braunschweig. *Jb. preuss. geol. Landesanst.* **25** : 218–245, pls. 6, 7.

Brodie, P. B., 1845, *A History of the Fossil Insects in the Secondary Rocks of England.* London : xviii + 130 pp., 11 pls.

Handlirsch, A., 1906 (–1908), *Die fossilen Insekten und die Phylogenie der rezenten Formen.* Leipzig : ix + 1430 pp., 24 figs., 51 pls.

——, 1939, Neue Untersuchungen über die fossilen Insekten mit Ergänzungen und Nachträgen sowie Ausblicken auf phylogenetische, palaeogeographische und allgemein biologische Probleme. II. Teil. *Ann. naturh. Mus. Wien* **49** : 1–240, pls. I–XVI.

Tillyard, R. J., 1916, Mesozoic and Tertiary Insects of Queensland and New South Wales. Descriptions of the Fossil Insects by R. J. Tillyard. *Qd geol. Surv. Publ.* **253** : 11–60, figs. 4–6, pls. 1–7.

——, 1922, Mesozoic Insects of Queensland. No. 9. Orthoptera, and additions to the Protorthoptera, Odonata, Hemiptera and Planipennia. *Proc. Linn. Soc. N.S.W.* **47** : 447–470, figs. 72–89, pls. LI–LIII.

——, 1925, The British Liassic Dragonflies (Odonata). *Brit. Mus.* (*nat. Hist.*) *Foss. Ins.* **1** : 40 pp., 14 figs., 5 pls.

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